

1966 OPERATING SUMMARY

MARKHAM

VILLAGE

***water pollution
control plant***

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Markham Village Local Advisory Committee,
Village of Markham.

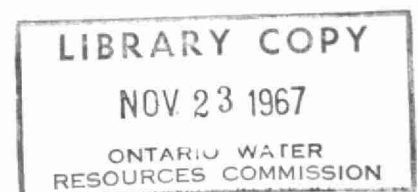
Gentlemen:

We are pleased to submit to you the 1966 Operating Summary for the Markham Village Water Pollution Control Plant, OWRC Project Nos. 59-S-40 and 60-S-55.

It is hoped that our joint participation in efforts to combat water pollution will have even more success in the coming year.

Yours very truly,

D. S. Caverly,
General Manager.





ONTARIO WATER RESOURCES COMMISSION

801 BAY STREET

TORONTO 5

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VICE-CHAIRMAN

D. S. CAVERLY
GENERAL MANAGER

W. S. MACDONNELL
COMMISSION SECRETARY

General Manager,
Ontario Water Resources Commission.

Dear Sir:

I am happy to present you with the 1966 Operating Summary for the Markham Village Water Pollution Control Plant, OWRC Project Nos. 59-S-40 and 60-S-55.

The report offers a concise summary of operating data for the year and comparisons with previous years where these are applicable and significant.

Yours very truly,

A handwritten signature in cursive script, appearing to read "B. C. Palmer".

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

FOREWORD

● This operating summary contains complete information on the management of the project during 1966. It contains a concise review of the year's plant operation, significant financial details, and a visual presentation in graphs and charts of technical performance.

The information will be of value to interested parties in assessing the adequacy of the project at this time and its ability to meet future requirements.

The report is the result of co-operation by several groups within the Division of Plant Operations. These include the statistics section and the technical publications section. The Division of Finance and the draughting section of the Division of Sanitary Engineering were also closely associated with its publication.

The Regional Operations Engineer, however, has had the primary responsibility for the content, and will be happy to answer any questions regarding it.

C O N T E N T S

Foreword	1
Title Page	3
'66 Review	5
Project Costs	6
Operating Costs	7
Process Data	9
Conclusions	Inside back cover

MARKHAM VILLAGE
water pollution control plant

operated for

THE VILLAGE OF MARKHAM

by the

ONTARIO WATER RESOURCES COMMISSION

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Assistant Director: C. W. Perry
Regional Supervisor: D. A. McTavish
Operations Engineer: R. Kauppinen

801 Bay Street Toronto 5

'66 REVIEW

The total operating cost for Markham Village Water Pollution Control Plant during 1966 was \$17,931.30, an increase of 12.7% over 1965 costs. However, all unit costs showed a pronounced decreasing trend during 1966. The cost per family per year was down 26.9% to \$6.78; the cost per million gallons of raw waste treated was down 24.3% to \$102.86, and the cost per pound of BOD removed diminished by approximately 9% to 7.3 cents.

The total volume of raw waste treated at the plant for the year was 174,330,000 gallons, an increase of 40.8% over the 1965 flow. This was equivalent to an average daily flow of 478,000 gallons per day, considerably in excess of the design plant flow of 334,000 gallons per day. Consequently, the plant was severely overloaded.

During 1966, 122 tons of BOD and 163 tons of suspended solids were removed from the raw waste. The removal efficiencies for the BOD and suspended solids averaged 75.0% and 76.5% respectively. Grit removal for the year amounted to 187 cubic feet.

The digester was out of service for part of the year, and it was necessary to haul 67,230 cubic feet of raw sludge during this period. While out of service, the roof was inspected, sand-blasted and repainted. Gas piping, diffusers and associated appurtenances were installed to provide for mixing of the digester contents when the plant is expanded.

A total of 5904 pounds of chlorine were used to disinfect the final effluent of the plant during 1966. A chlorine residual of 0.5 ppm was maintained after a 15-minute contact time.

In general, the plant was well maintained and operated throughout the year considering that it was severely overloaded.

PROJECT COSTS

(59-S-40 ONLY)

NET CAPITAL COST (Final) Long Term Debt to OWRC	\$608,711.07
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1966	\$ <u>86,534.68</u>
Net Operating	\$ 17,931.30
Debt Retirement	12,284.00
Reserve	3,150.37
Interest Charged	34,247.48
TOTAL	\$ <u>67,613.15</u>

RESERVE ACCOUNT

Balance at January 1, 1966	\$ 21,806.37
Deposited by Municipality	3,150.37
Interest Earned	<u>1,123.80</u>
	\$ 26,080.54
Less Expenditures	<u>8,981.40</u>
Balance at December 31, 1966	\$ <u>17,099.14</u>

MONTHLY OPERATING COSTS

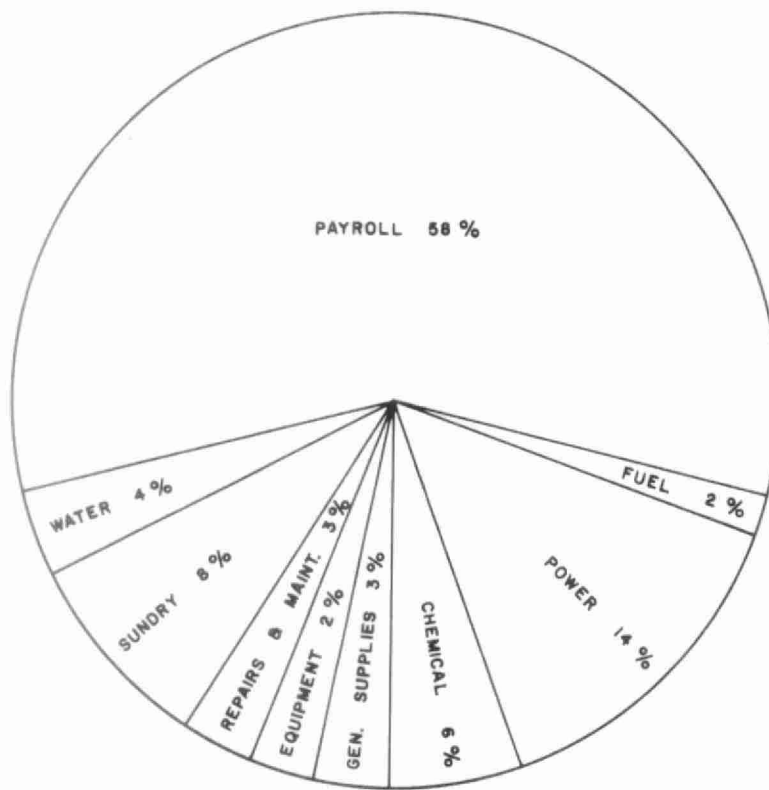
MONTH	TOTAL EXPENDITURE	PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	1490.60	737.09	96.02	207.36		16.90		90.95	342.28	
FEB	1322.19	725.87		214.16	224.03	45.78			26.38	85.97
MARCH	1011.05	734.13		207.57		31.52			37.83	
APRIL	1692.81	1327.87		190.86		52.19		5.92	20.51	95.47
MAY	1109.44	787.77		183.90	87.32	29.86			20.59	
JUNE	1554.52	857.15		195.02	228.38	96.21		26.61	39.72	111.42
JULY	1511.54	779.18	98.70	181.80		36.53		41.80	23.63	
AUG	1127.33	779.18		171.56		32.86			21.02	122.71
SEPT	2010.76	1271.95		191.37	228.38	74.46		33.41	211.19	
OCT	1439.52	779.13		175.44		2.89			356.64	125.37
NOV	1817.96	792.05		181.13	228.38	102.79	276.08	195.18	42.35	
DEC	2193.48	797.63	98.70	392.69		63.64	192.48	163.53	361.88	122.93
TOTAL	17931.30	10369.06	293.42	2492.86	996.49	585.62	468.56	557.40	1504.02	663.87

YEARLY OPERATING COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1961	27,375	\$14395.33	* \$13.03	\$525.85	23 CENTS
1962	45,625	\$15920.73	\$13.57	\$348.94	14 CENTS
1963	60,225	\$16771.42	\$12.40	\$278.00	11 CENTS
1964	84,180	\$15120.53	\$10.34	\$179.62	7 CENTS
1965	116,884	\$15909.13	\$ 9.27	\$136.11	8 CENTS
1966	174,330	\$17931.30	\$ 6.78	\$102.86	7.3 CENTS

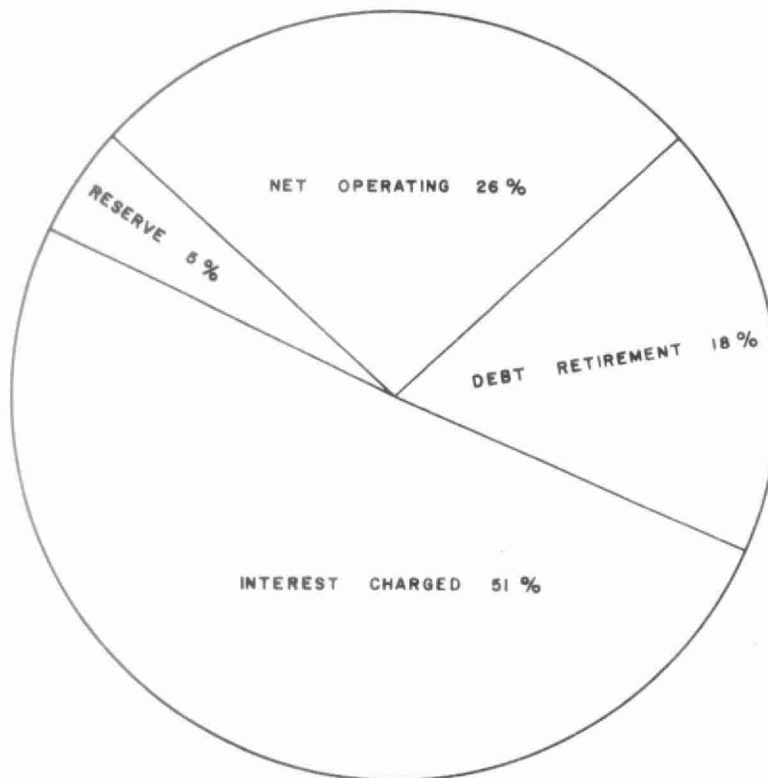
* BASED ON ESTIMATED ANNUAL POPULATION AND 3.9 PERSONS PER FAMILY

1966 OPERATING COSTS



TOTAL ANNUAL COST

(59 — S — 40)

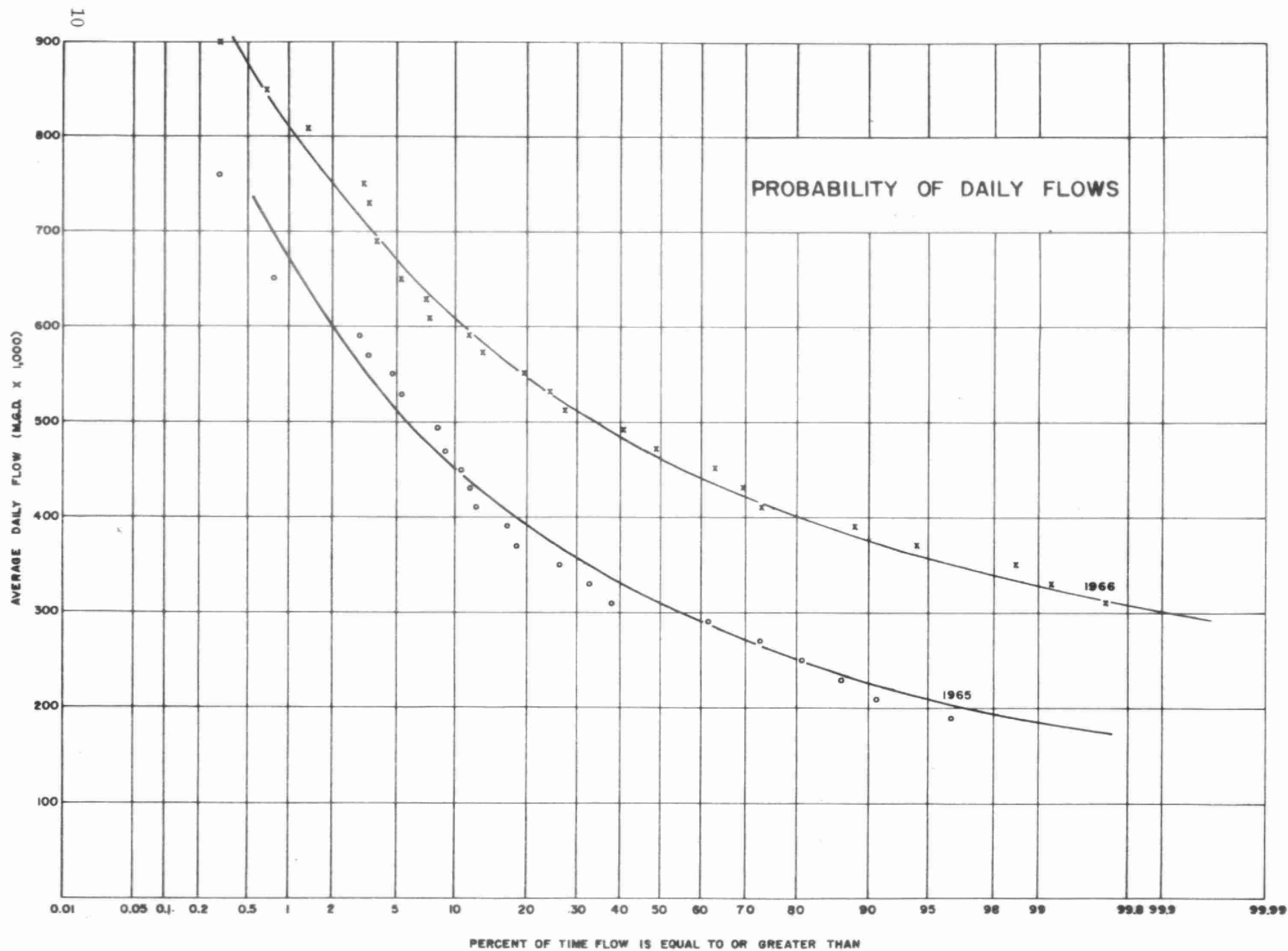


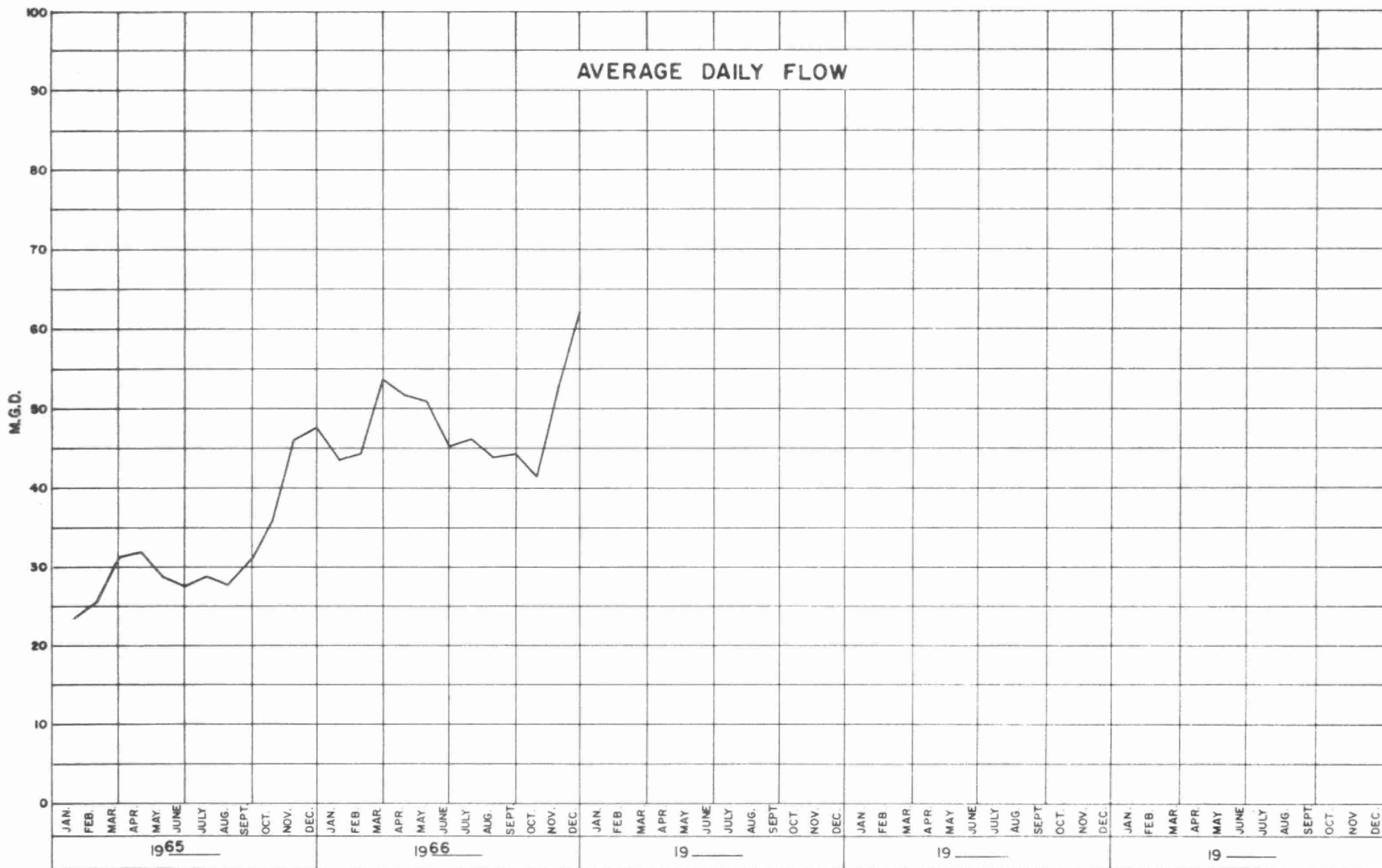
Process Data

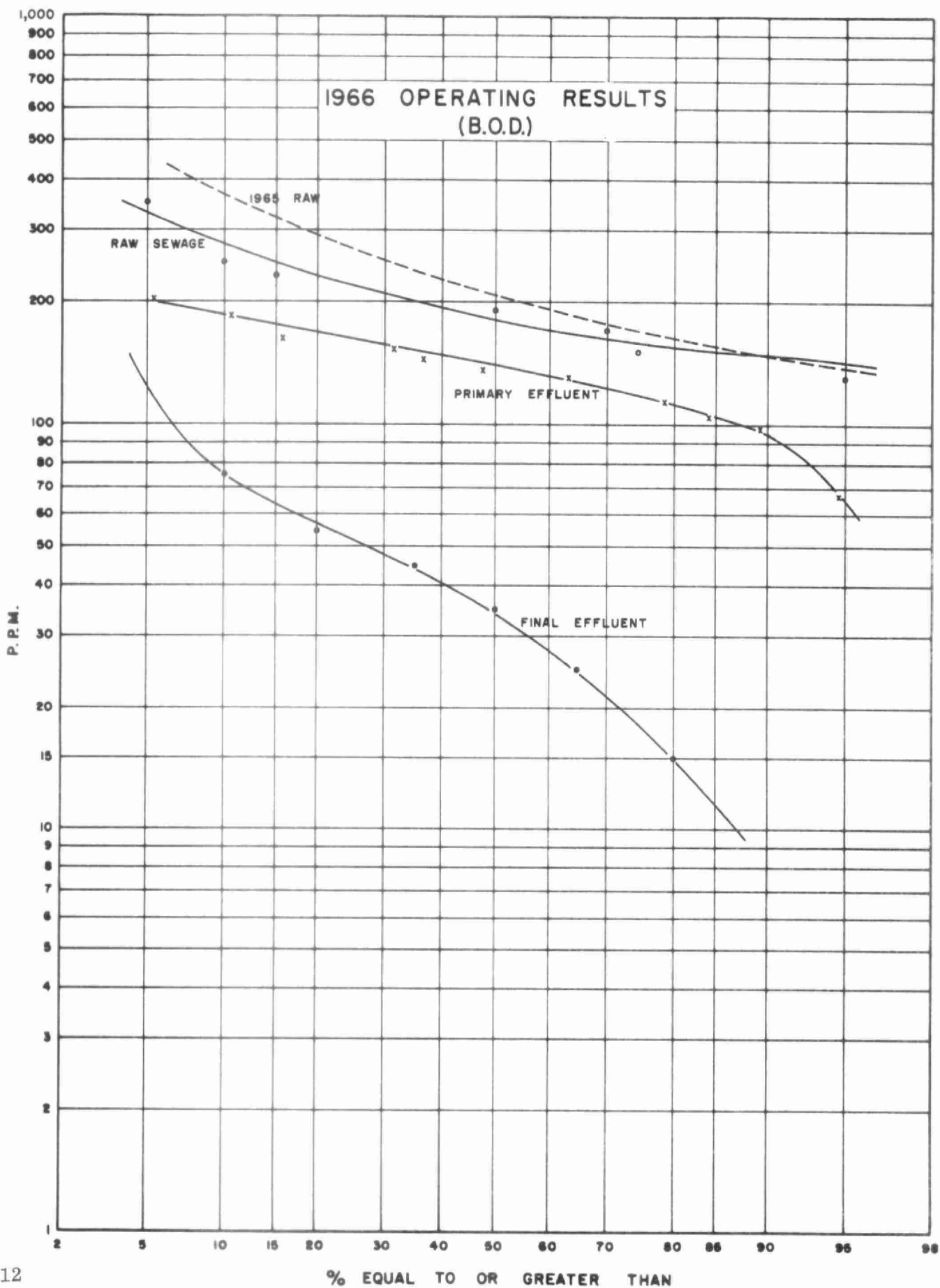
FLOWS

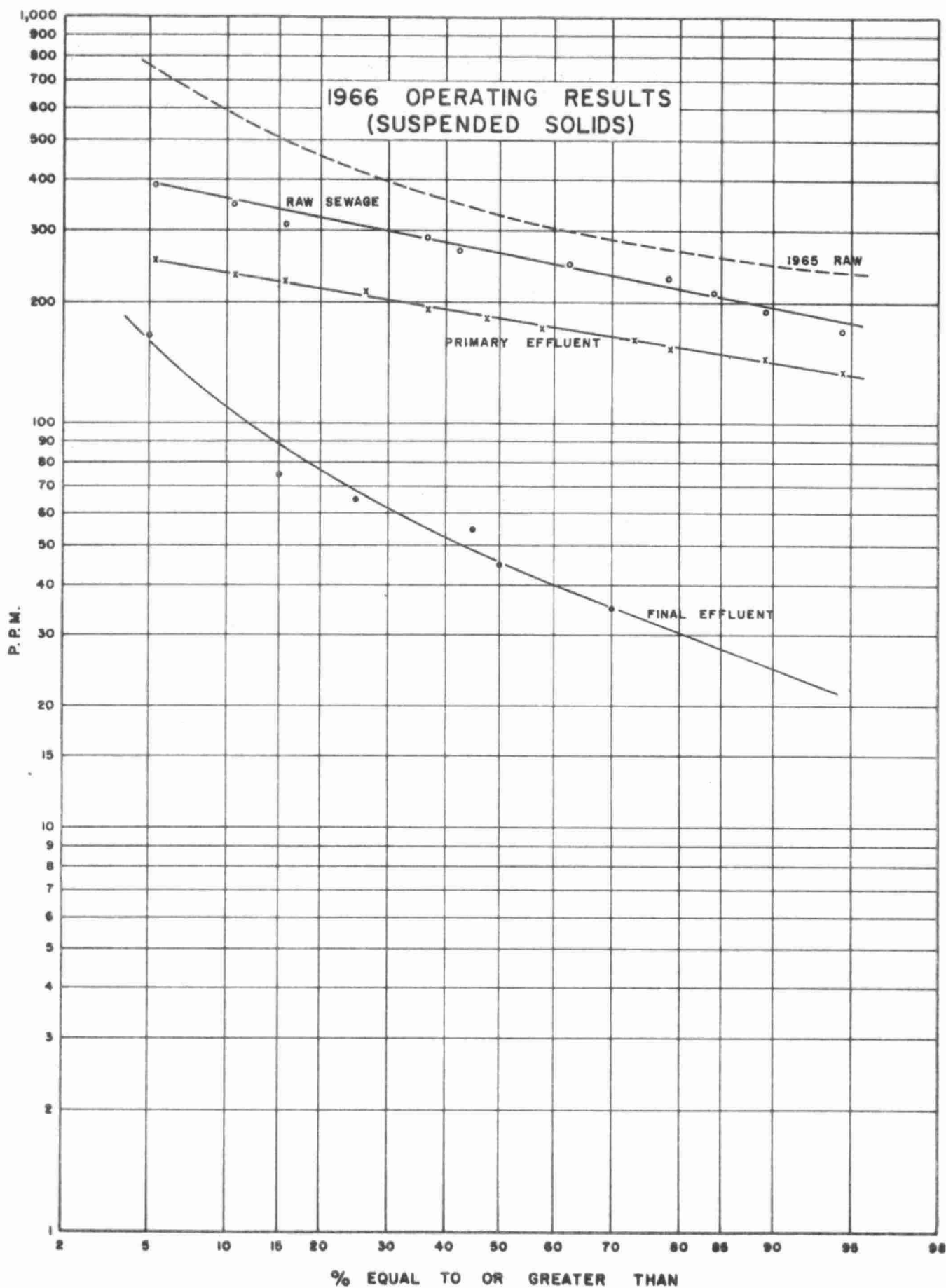
On the average daily flow graph, a marked increasing trend in flows may be seen throughout 1965 and 1966. The average daily flow for 1965 was 319,000 gallons per day. This increased approximately 41% to 478,000 gallons per day in 1966. On the probability plot, it is seen that during 1965, the plant design daily flow of 334,000 gallons per day was exceeded approximately 38% of the time; whereas during 1966 the design daily flow was exceeded about 98.5% of the time. This indicates that the plant has been severely overloaded.

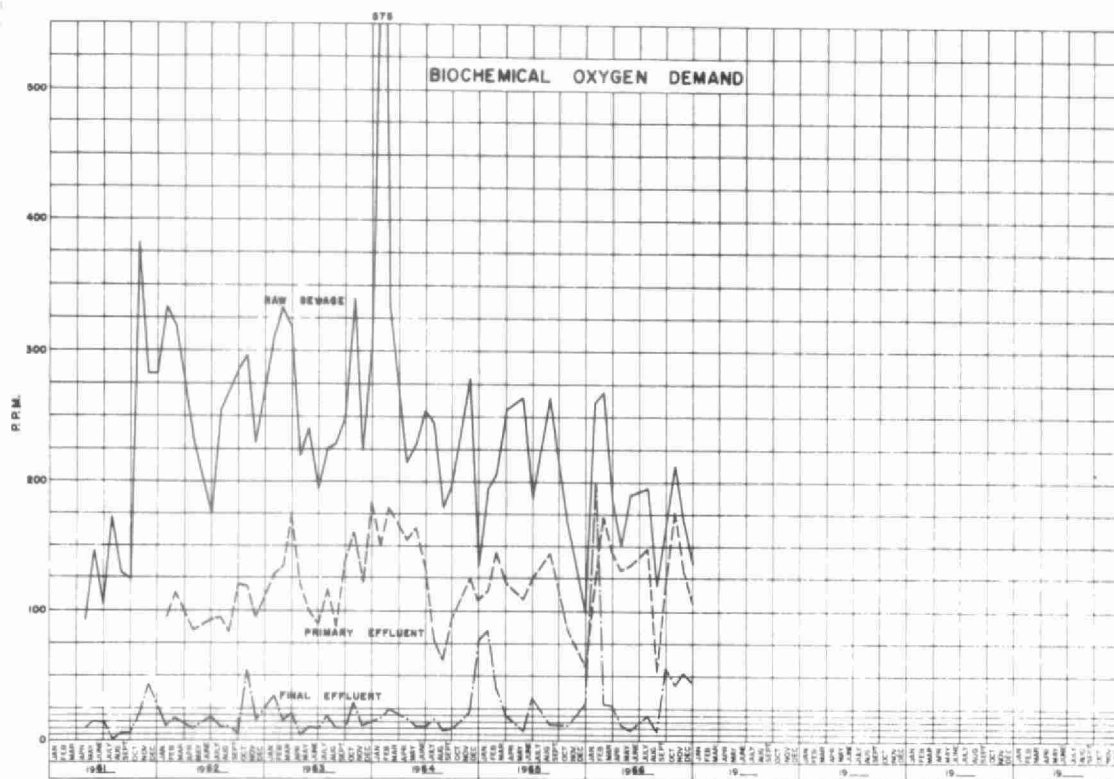
Throughout the year, the plant was operated in such a manner that all waste flows received primary treatment, but flows up to 400,000 imperial gallons per day were given secondary treatment. From past experience, it has been found that this method of operation best maintains the efficiency of the activated sludge process at the plant.



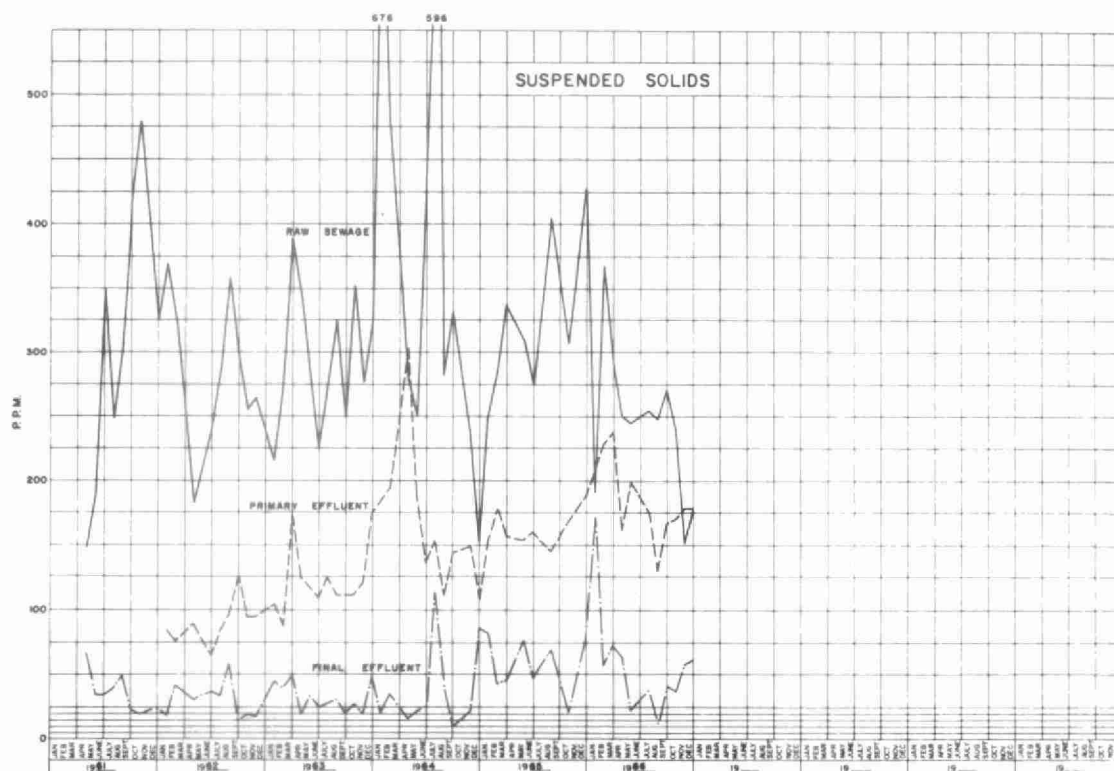








MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	260	200	23.0	4.0	192	170	11.5	1.5	36
FEB.	270	29	89.0	14.0	368	57	84.5	18.0	21
MAR.	180	28	84.5	12.6	293	72	75.5	18.3	20
APR.	150	12	92.0	10.7	250	64	74.5	14.4	12
MAY	190	9	95.5	14.2	245	22	91.0	17.6	8
JUNE *	186	46	75.0	9.5	* 245	58	76.5	12.6	8
JULY	195	20	89.5	12.5	255	38	85.0	15.5	13
AUG.	121	8	93.5	7.7	247	14	94.5	15.8	16
SEPT.	158	57	64.0	6.2	271	42	84.5	14.0	6
OCT.	212	44	79.0	10.8	240	38	84.0	12.9	9
NOV.	170	54	68.0	9.1	152	58	62.0	7.4	9
DEC.	137	46	66.5	8.7	178	63	65.0	11.0	29
TOTAL	-	-	-	122.0	-	-	-	163.0	187
AVG.	186	46	75.0	10.2	245	58	76.5	13.6	16

* No sample; average values substituted.

COMMENTS

During 1966, the average 5-day BOD of the raw sewage and final effluent was 186 ppm and 46 ppm respectively, giving a 75.0% removal efficiency. A total of 122.0 tons of 5-day BOD were removed from the Village wastes during the year.

The raw sewage had an average of 245 ppm suspended solids and the final effluent had an average of 58 ppm suspended solids during the year. The solids removal efficiency was 76.5%.

The total grit removal for the year was 187 cubic feet of 1.07 cubic feet per million gallons of sewage treated.

It should be noted that the final effluent BOD and SS concentration of 46.0 and 58 ppm respectively are considerably in excess of the OWRC objectives of 15.0 ppm for both BOD and suspended solids. However, considering the overloading imposed on the plant, the removal efficiencies of 75.0% and 76.5% for BOD and suspended solids respectively were reasonable.

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. PPM.	CUBIC FEET AIR PER LB. BOD. REMOVED
JANUARY	-	-
FEBRUARY	173	1812
MARCH	145	1725
APRIL	132	1714
MAY	134	1668
JUNE	-	-
JULY	149	1735
AUGUST	57	4823
SEPTEMBER	122	4019
OCTOBER	177	1910
NOVEMBER	130	2627
DECEMBER	105	2934
TOTAL	-	-
AVERAGE	132	2497

COMMENTS

The average primary effluent BOD during 1966 was 132 ppm and 2497 cubic feet of air was required to remove each pound of BOD applied to the aeration section.

DIGESTER OPERATION

Month	Sludge from Digesters 1000's cu. ft.**	Month	Sludge from Digesters 1000's cu. ft.**
January	7.29	July	10.58
February	-	August	13.14
March	-	September	9.62
April	-	October	14.10
May	-	November	4.81
June	7.69	December	-
	Total	67.23	
	Average	5.60	

** Figures refer to raw sludge haulage while digester out of service.

COMMENTS

During 1966, the interior of the digester was reconditioned, and with a view toward plant expansion in the near future, diffusers were installed in the digester to accommodate gas mixing equipment. The digester was pumped down and cleaned out in the latter part of May. The interior of the floating-cover roof was inspected and painted, and the gas recirculating diffusers with their associated piping and appurtenances were installed.

While the digester was out of service for this work, the raw sludge from the primary tank was hauled away and disposed of by tank truck. After completion of this work, the digester was placed back into service in mid-November.

The total cost of this work was approximately \$9,100, with \$8,600 being used from the Reserve Fund.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	13,500	414	3.07
FEBRUARY	11,585	392	3.38
MARCH	16,580	435	2.62
APRIL	15,545	409	2.63
MAY	15,743	450	2.86
JUNE	13,529	485	3.58
JULY	14,260	570	4.00
AUGUST	13,595	534	3.93
SEPTEMBER	12,235	510	4.17
OCTOBER	12,820	556	4.34
NOVEMBER	15,743	565	3.59
DECEMBER	19,195	584	3.04
TOTAL	174,330	5904	-
AVERAGE	14,528	492	3.39

COMMENTS

A total of 5904 pounds of gaseous chlorine was added to the final effluent at an average dosage rate of 3.39 ppm. A chlorine residual of 0.5 ppm after a 15-minute contact time was maintained in order to disinfect the final effluent.



CONCLUSIONS

The plant was overloaded during the year and this was reflected in the quality of the final effluent which was poorer than normally expected of secondary treatment plants.

RECOMMENDATIONS

The plant capacity should be increased and presently plans are being prepared to double the capacity of the plant.

